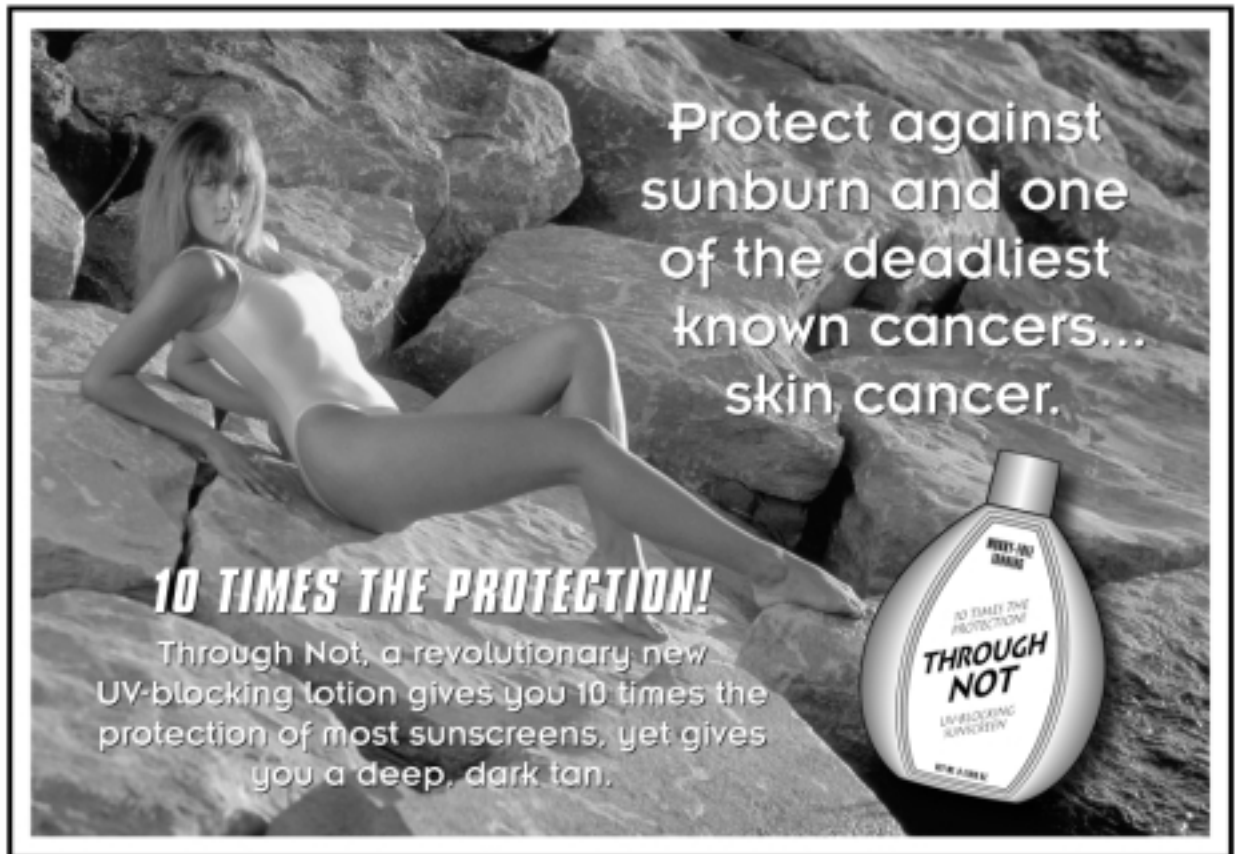


Media Item 1

Work with your teammates to review this media item. First, identify the claims the item makes about the product, ultraviolet light, and cancer. Then, describe the evidence on which these claims are based.



Media Item 2

Work with your teammates to review this media item. First, identify the claims the item makes about the product, ultraviolet light, and cancer. Then, describe the evidence on which these claims are based.


Are you risking eye damage every time you go out in the sunlight?



New Vision UV-blocking eyewear – available at finer retailers nationwide. Learn more on our web site: www.newvision.com.

Media Item 3

Work with your teammates to review this media item. First, identify the claims the item makes about the product, ultraviolet light, and cancer. Then, describe the evidence on which these claims are based.



CELLO-BRELLA

CELOPHANE BEACH UMBRELLA

Forget your fear of skin cancer and let the power of cellophane help you tan without burning!

This summer, join the thousands of people who will be basking under Cello-Brella beach umbrellas. Made of ordinary red, green, blue or yellow cellophane, these umbrellas block 80 percent of harmful ultraviolet rays, while permitting the gentle, even tan you've always wanted. To order, call:

1-800-CELLO-10

Specify color when ordering.

Media Item 4

Work with your teammates to review this media item. First, identify the claims the item makes about the product, ultraviolet light, and cancer. Then, describe the evidence on which these claims are based.



No more tan lines!
Get an all-over tan...right
through your swimsuit.

Our revolutionary
new MicroPore fabric
takes the worry out
of sunbathing:

No unsightly tan lines.
Protects against sunburn.
Prevents skin cancer.

Available in over
100 beautiful styles for
men and women.

Call 1-800-555-4TAN or
see us on the web at
www.solarisswim.com.

SOLARIS
SWIMWEAR

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Using a Model System to Test Claims About UV Light

You and your teammates will use yeast as a model system for testing a claim your media item made about a particular product and UV light. Follow the steps below to design and conduct a controlled experiment that tests such a claim.

Learn About UV Light and Yeast

1. Read the following paragraphs to learn about ultraviolet (UV) light and the yeast you will use to test claims about UV light.

What is UV light?

UV light is one of the forms of radiation that is produced by the sun and by a variety of other sources (for example, certain types of artificial lights). UV light is not visible to us, but it is all around us. It is the part of sunlight that causes sunburns and tans. It also is the part of sunlight that can cause skin cancer.

Why is UV light dangerous?

UV light can damage the DNA inside cells. Cells repair most of this damage, but occasionally a cell makes a mistake during this repair process. This mistake causes a mutation in one of the cell's genes. The accumulation of mutations inside skin cells can lead to skin cancer.

What are yeast?

Yeast—in this case, baker's yeast (scientific name, *Saccharomyces cerevisiae*)—are a simple, single-celled form of fungus. Yeast reproduce both sexually and asexually and have simple nutritional needs. You need a microscope to see a single yeast cell. But that cell can grow into a whole colony of cells (that you can just barely see) in one day if it is provided with the right conditions.

Why are yeast a good organism for testing claims about UV light?

Yeast are easy to grow in the laboratory. The type of yeast that you will use is especially sensitive to UV light. It cannot repair the damage that UV light causes to its DNA. Thus, these yeast are killed by sunlight. As you will see, you can use these UV-sensitive yeast to measure the killing effect of sunlight under different conditions.

Human skin cells (as well as normal yeast cells and most other normal cells) have enzymes that repair damage to DNA that is caused by UV light. But when too much damage occurs (as might occur, for example, when a person spends a great deal of time outdoors), the repair enzymes may not be able to keep up. Across time, mutations may accumulate inside skin cells, leading to cancer. UV-sensitive yeast are a good **model** for testing products claimed to protect a person from skin cancer because the yeast's sensitivity allows the damaging effects of UV light to be observed very quickly.

Write a Hypothesis

2. Write the claim you would like to test about UV light.

Be sure that your claim is related in some way to your media item. An example of a claim about UV light is that the higher the altitude on the earth's surface, the greater the amount of UV light present.

3. Now write the claim that you want to test in the form of a question.

If you wanted to test the claim that more UV light reaches the earth's surface at higher altitudes than at lower altitudes, you might ask, "Does more UV light reach the earth's surface at higher altitudes than at lower altitudes?"

4. Write a tentative answer to your question.

Scientists call such tentative answers "hypotheses." Your hypothesis about UV light and altitude might read, "Yes, more UV light reaches the earth's surface at higher altitudes than at lower altitudes."

5. Use your hypothesis to write a prediction.

A prediction is a sentence that describes something that would happen if your hypothesis is correct. For example, your prediction about UV light and altitude might read, "If the amount of UV light that reaches the earth's surface increases with increasing altitude, then the maximum at altitude X will be greater than the maximum at altitude Y."

Design an Experiment

6. Describe the major parts of your experiment.

- What are your variables? That is, what will you change? What else might change?

In the UV light and altitude experiment, you would need to change the altitude at which you measure the UV light coming from the sun. The amount of UV light might also change as a result of the difference in altitude.

- What will you measure?

In the UV light and altitude experiment, you would measure the altitude and the maximum amount of UV light received in a certain size area during a certain length of time.

- How will you measure this?

In the UV light and altitude experiment, you might use published values for altitude, and you might measure the ability of UV light to kill UV-sensitive yeast as an indication of the amount of UV light received during a certain period of time.

- What is your control?

A control is a group of individuals in an experiment that do not receive the treatment given to the test subjects. In the UV light and altitude experiment, you might prepare a set of identical plates and expose half to UV light at the two altitudes, but leave the other half unexposed. The unexposed plates are your controls.

7. Write a description of your experiment and submit it to your teacher for approval. Make any changes your teacher suggests.

Conduct the Experiment

8. Follow the instructions below for spreading your plates of yeast and conducting your experiment.

Collect the following materials:

- culture of G948-IC/U yeast (1 per team)
- sealed tube containing 10 to 15 ml of sterile water (1 per team)
- packet of sterile toothpicks (1 per team)
- 1-ml sterile calibrated bulbed transfer pipet (1 per team member)
- petri plate containing YED agar medium (1 per team member)

Your teacher will indicate other materials that you may need to test your claim.

- a. Open one end of your packet of toothpicks and carefully remove just one toothpick. (**Do not touch the other end of the toothpick.**)
- b. Make a visibly turbid yeast suspension by using the toothpick to scrape some yeast from your culture plate and wiping them off on the inside of your tube of sterile water. Replace the lid and swirl to mix. If the suspension is not visibly cloudy, add more yeast cells, using a new toothpick.
- c. Swirl the tube to resuspend the cells before removing each sample. Remove the sterile pipet from its wrapping just before you use it and carefully remove 1 ml of the yeast suspension. (**Do not touch the end of the pipet.**)
- d. Lift the lid of a YED agar plate at an angle just enough to deposit the 1 ml of the suspension directly onto the surface of the plate. Replace the lid of the plate.
- e. Tilt and rotate the plate to spread the cells over the surface of the agar. If the liquid does not cover, use the blunt end of a toothpick to spread the suspension.
- f. Let the agar absorb the liquid until it disappears (about 10 minutes).
- g. Secure the lid to the bottom of the petri dish using a small piece of tape on the side of the dish. (The plastic lid of the petri dish does not absorb a significant amount of the UV light found in sunlight, but the tape will.)
- h. Treat your plates according to the experimental plan you devised. Then, if appropriate, expose the plates to direct sunlight outdoors for the number of minutes given in the table below.

Exposure Times for Yeast Plates

Time of Year	Midmorning (Minutes)	Noon (Minutes)	Midafternoon (Minutes)
summer	3–4	2–3	3–4
spring and fall	5–6	3–4	4–5
winter	40–50	15–20	20–30

- i. Incubate your plates **in the dark**, overnight at 30°C, or two days at room temperature. Incubate with the agar side up to prevent condensation from dropping on the colonies.

Record the Results

9. Collect your plates from the previous day and describe in writing and/or sketch the results on each plate.

Report the Results

10. Present your results in the following manner:

- a. State the claim you tested.
- b. Explain how you tested the claim. (For example, What did you change? What did you measure?)
- c. Describe your results.
- d. State your conclusion(s).

Evaluating Claims About Cancer

Follow the steps below to evaluate another team's media item.

1. Identify the claims.

Ask yourself, "What are the explicit (obvious, stated) and implicit (less obvious, not stated directly) claims being made here?"

2. List the evidence.

Ask yourself, "What evidence is offered to support each of these claims?"

3. Evaluate the evidence.

Ask yourself questions such as the following:

- What is the source of the evidence?
- Who did the experiment? Who funded it? Is there any reason to think the results might be biased?
- How many subjects were in the study? Were there proper controls?
- Are there other reasons the researchers might have obtained these results?
- What other ways could these claims be tested? Is there any way I can test these claims?

- Where else could I find reliable information about this topic?

4. Evaluate the claim.

Ask yourself whether, based on the evidence, you accept the claim, accept it tentatively until you can learn more about it, or reject the claim.

5. If appropriate, act on the basis of your evaluation.

Ask yourself what you should do, based on the outcome of your evaluation.